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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/001,800	12/05/2001	Tomio Sugiyama	2635-40	2313

7590 11/15/2004

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EXAMINER

OLSEN, KAJ K

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/001,800

Applicant(s)

SUGIYAMA ET AL.

Examiner

Kaj K Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9-14-2004
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al (USP 5,302,276) in view of Suzuki et al (USP 4,718,999). This combination of references was previously relied on, but the rejection was withdrawn in the final rejection (see paragraph 17 of the final rejection). Upon further consideration, the examiner is reintroducing the rejection (see discussion below).
3. Kato discloses a gas sensing element comprising a solid electrolyte substrate 3 having oxygen ion conductivity, a measured gas side electrode (1 or 11) provided on a surface of said solid electrolyte substrate so as to be exposed to a measured gas (fig. 1), a reference gas side electrode (2 or 12) provided on another surface of said solid electrolyte substrate so as to be exposed to a reference gas (fig. 1). Kato also discloses a porous electrode protecting layer (5 or 15) covering said measured gas side electrode, and reports that the desired gas permeability of this protective layer overlaps the claimed limit current density when the permeability is multiplied by the factor 0.1 (i.e. for an oxygen percentage of 0.1 %) (col. 2, lines 14-17). Although Kato does not explicitly define this gas permeability as also being a limit current density, it would appear to the examiner that Kato is referring to a quantity that reads on the

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applicant's term in view of Kato, col. 4, lines 21-37. Although Kato has defined its limit current density in terms of area of the actual protective layer and not in terms of the area of the reference electrode as set forth by the claim, Kato's set forth permeability still reads on the claimed limit current density in terms of the reference electrode area because the protective layer (5 or 15) area is clearly greater than 2.5% of the total area of the reference electrode (only at less than 2.5% would the 1.6 mA of Kato (see above) read away from the claimed lower limit of 0.04 mA).

With respect to the conditions the sensor is operating under for the claimed limit current density, Kato teaches both the oxygen concentration as well as the temperature (col. 4, lines 21-35). Although Kato does not explicitly teach the use of 0.5 V, Suzuki teaches that for limit current measurements, at least 0.5 V must be applied in order to get to the limit (i.e. saturation) current region of the sensor and specifically teaches the use of voltages between 0.5 and 1 V (fig. 4 and paragraph bridging col. 5 and 6). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Suzuki for the gas sensing element of Kato in order to ensure a sufficient voltage is applied to get to the limit current region of the sensor operation.

4. With respect to the sintering together, see col. 3, lines 14-36.
5. With respect to the heater, see col. 3, lines 45-47.
6. With respect to the claimed permeation rate, it would appear that the permeation rate would be synonymous with permeability. Hence, because Kato teaches a permeability that overlaps the permeability of the claimed protective layer, Kato must inherently also possess the specified permeability.

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7. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato and Suzuki as applied to claim 1 above, and further in view of Fujii.

8. Kato and Suzuki set forth all the limitations of the claims, but did not explicitly set forth what the thickness of the protecting layer should be. Fujii set forth the protecting layers having the claimed thickness provides for a suitable level of porosity for the protective layer. See col. 7, lines 16-19. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Fujii for the sensor of Kato and Suzuki because said thickness has been demonstrated to provide a suitable level of porosity for a protective layer. With respect to the claimed pore diameter, because Kato already teaches the claimed permeability for the protective layer and teaches a construction of the protective layer that is largely analogous to that of the instant invention, Kato either inherently possesses the claimed pore diameter or the claimed pore diameter is an obvious choice of pore size for arriving at the desired permeability. Alternatively, Fujii already teaches that the use of the claimed pore diameter are conventional choices of pore diameter (see previous office actions) and the utilization of conventional pore sizes for the protective layer of Kato requires only routine skill in the art.

Response to Arguments

9. The examiner has withdrawn the rejection relying on Fujii as a primary teaching because of the applicant's arguments of pp. 1-3. In particular, the examiner recognizes that protective layer thickness and pore size do not solely determine the limit current density of a protective layer. Although the examiner is not persuaded by the various arguments that Fujii would not

have had the claimed limit current density, the larger issue is that the examiner cannot establish prima facie case for the inherency of the claimed conditions based on Fujii's cited layer thickness and pore size.

10. The examiner is reintroducing the rejection utilizing Kato in view of Suzuki. In the previous final rejection, the examiner indicated that it was unclear what the overall permeability of the sensor would match the permeability given and col. 2, lines 14-17 (see paragraph 17 of the final rejection). However upon reconsideration, it is noted that the claim does not require the limit current density of the entire sensor be in the claimed range, but only the limit current density of the electrode protecting layer be in the claimed range. Hence even though there are other porous layers on the sensor of Kato does not obviate that Kato teaches the presence of a particular layer having the claimed properties. With respect to applicant's arguments concerning this teaching in the response of 12-4-2003, applicant urges it is inappropriate for the examiner to rely on the gas permeability of one of the porous protective layers as allegedly teaching the claimed invention. First, the mere presence of a plurality of protective layers is not an issue because the claims are constructed with open language (i.e. the invention is "comprising" a protective layer) and the claimed invention is not limited to a single protective layer. Second, the applicant not claiming a limit current density per se, but rather a protective layer that could provide said current density. Because Kato reports a permeability in the mA/mm² units (albeit a different mm² unit (see discussion above)) that overlaps the claims mA/mm² units, Kato thereby inherently meets the claimed limitation. The fact that the other protective layers might have higher or lower permeabilities (and hence higher or lower limit currents) is irrelevant if Kato does have a protective layer that meets the claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Thursday from 5:30 A.M. to 3:00 P.M. and on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
November 10, 2004


KAJ K. OLSEN
PRIMARY EXAMINER